

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
International Bureau Seeks Comment on) IB Docket No. 17-172
Implementing Earth Station Siting Methodologies)

**Reply Comments of SES Americom, Inc.; O3b Limited; Hughes Network Systems, LLC;
Inmarsat, Inc.; WorldVu Satellite Ltd. d/b/a OneWeb; and Telesat**

SES Americom, Inc. (“SES”); O3b Limited (“O3b”); Inmarsat, Inc.; Hughes Network Systems, LLC (“Hughes”); WorldVu Satellite Ltd. d/b/a OneWeb; and Telesat (collectively, the “Satellite Operators”)¹ hereby respond to comments submitted in response to the Commission’s public notice seeking input on implementing the methodology for siting earth stations operating in the 27.5-28.35 (“28”) GHz band and the 37.5-40 (“37/39”) GHz band under the recently adopted Section 25.136 of the Commission’s rules.²

The commenters in this proceeding generally agree that the key to ensuring fixed satellite service (“FSS”) earth stations can effectively access the 28 GHz and 37/39 GHz bands as the Commission intended³ is establishing a framework that will accurately reflect the population and area impacted by a proposed earth station as well as other earth stations licensed under Section

¹ Hughes and OneWeb did not participate in the initial comments submitted by the Satellite Operators, but submitted individual comments in the proceeding. *See* Comments of EchoStar Satellite Operating Corporation and Hughes Network Systems, LLC, IB Docket No. 17-172, (July 21, 2017) (“Hughes Comments”); Comments of WorldVu Satellites Limited, IB Docket No. 17-172, (July 21, 2017) (“OneWeb Comments”).

² Public Notice, International Bureau Seeks Comment on Implementing Earth Station Siting Methodologies, IB Docket No. 17-172, (June 21, 2017) (“*Public Notice*”).

³ *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, ¶ 51 (2016) (“We believe there is value in creating meaningful, targeted opportunities to deploy additional FSS earth stations in the [28 GHz] band without harming terrestrial operations.”); *see also id.* at ¶¶88-93.

25.136(a)(4) or (c) of the Commission’s rules in the same band in an Upper Microwave Fixed Use Service (“UMFUS”) license area. In addition to encouraging competition among earth station and satellite operators by facilitating more than one earth station within an UMFUS service area, an accurate picture of the affected population will also provide UMFUS licensees a clear means of identifying where they can expect to experience interference in the 28 GHz band or must protect an earth station receiving in the 37/39 GHz band. As the Satellite Operators proposed in their comments, earth station operators should also work collaboratively to define an accurate picture of the impact both existing and proposed earth stations will have on the population in an UMFUS license area.⁴

I. APPLICANTS SHOULD PROVIDE THE MOST ACCURATE PICTURE POSSIBLE OF AN EARTH STATION’S AFFECTED AREA

As noted in the original comments, earth station applicants should be required to provide the most accurate information available at the time the application is filed to define the proposed earth station’s interference zone in the case of an earth station operating in the 28 GHz band or protection zone in the case of an earth station operating in the 37/39 GHz band (generally, “affected area”).⁵ This information includes the most accurate antenna pattern that may be available, which could be a measured pattern, a simulated pattern and in some cases may be the antenna mask defined in Section 25.209 of the Commission’s rules, as well as verifiable terrain and clutter data around the proposed earth station site. These proposals, which are intended to establish accuracy, should be balanced with rules that allow some flexibility, such as allowing non-geostationary orbit (“NGSO”) earth station applicants to use either the Time Variant Gain (“TVG”) or the Time Invariant Gain (“TIG”) method to calculate their gain toward the horizon and

⁴ Comments of SES Americom, Inc., O3b Limited, Inmarsat, Inc. and Telesat, IB Docket No. 17-172, at 5-6, (July 21, 2017) (“Satellite Operators Comments”).

⁵ *Id.* at 4-5.

allowing geostationary orbit (“GSO”) earth station applicants to apply for a range of orbital locations as long as they describe the pointing option that produces the highest population coverage.

A. APPLICANTS SHOULD BE ALLOWED TO USE THE SECTION 25.209 MASK

Some commenters discourage the Commission from allowing applicants to use the antenna mask defined in Section 25.209 of the Commission’s rules;⁶ however, those commenters neglect to consider that an applicant may not have chosen an antenna vendor or otherwise have precise antenna gain measurements or simulated patterns available by the time the application is filed. In order to ensure the Commission has sufficient time to process an earth station application, an earth station operator may apply for a license before the antenna purchase process is complete, in which case, it may not have measured or simulated patterns to use in its affected area calculations. If an applicant is required to provide measured or simulated patterns, which will only be available once a vendor is chosen, the Commission may be injecting unnecessary delay into the application process, potentially increasing the need for special temporary authority to operate, creating a delay in operations or otherwise reducing an earth station operator’s certainty that it can obtain a license for its chosen location.

The Satellite Operators recognize the use of the Section 25.209 mask could lead to an overestimation of the affected population, but this can be addressed by encouraging operators to provide either measured or simulated antenna patterns when necessary to provide a more accurate picture of the affected population. As discussed in their initial comments, the Satellite Operators recommend that the first earth station licensee in a particular band in an UMFUS license area

⁶ Comments of ViaSat, Inc., IB Docket No. 17-172, at 6, (July 21, 2017) (“ViaSat Comments”); Comments of The Boeing Company, IB Docket No. 17-172, at 6-7, (July 21, 2017) (“Boeing Comments”).

should be required to provide more accurate antenna patterns, which could include either measured or simulated gain patterns, at the request of another earth station operator seeking to site an antenna operating in the same band in the affected UMFUS license area, when such information becomes available. If the information is not available at the time of the request, the operators should cooperate to accurately reflect the affected population coverage in the UMFUS license area of both earth station locations. The Satellite Operators emphasize that such a review should not be used to limit the licensed operations of an antenna, but instead should be used to demonstrate that the actual affected population in an UMFUS license area is lower than described in the initial earth station application.

The Satellite Operators also agree with ViaSat that the near-field antenna pattern may have an effect on an antenna's affected area for earth station elevation angles below 10 degrees; and therefore an applicant proposing to transmit in the 28 GHz band below 10 degrees should certify that it has considered the near-field effects in establishing its interference zone.⁷

B. NGSO EARTH STATION APPLICANTS SHOULD HAVE FLEXIBILITY IN CALCULATING THEIR ANTENNA GAIN

The Satellite Operators agree with OneWeb that applicants seeking to operate earth stations with NGSO satellites using the 28 GHz or 37/39 GHz bands should be allowed to use either the Time Invariant Gain ("TIG") method or Time Variant Gain ("TVG") method to calculate their antenna gain.⁸ However, whichever method is used, an applicant should be required to specify the minimum elevation angle for the operation of its earth station. As OneWeb explained in its comments, the TIG method is a simpler calculation to conduct and may be the most

⁷ See ViaSat Comments at 6-7; the Satellite Operators concur that above 10 degrees, the near-field gain is not relevant as it does not point towards the horizon.

⁸ See Section 2.2 of Recommendation ITU-R SM.1448-0.

appropriate approach for assessing an antenna's gain at the time the application is prepared, but it can lead to an overestimation of the affected area.⁹ This overestimation can be addressed in the same way that overestimation resulting from use of the Section 25.209 mask can be addressed – a subsequent earth station applicant can provide a calculation using the TVG method or other evidence demonstrating that the actual affected area of the NGSO earth station is smaller than calculated in the original application. Additionally, the NGSO earth station operator and the new applicant should work collaboratively to define an accurate picture of the impact both existing and proposed earth stations will have on the affected population in an UMFUS license area.

C. GSO EARTH STATION APPLICANTS SHOULD HAVE SOME ANTENNA POINTING FLEXIBILITY

The Satellite Operators support the Commission's proposal to allow operators to take into account a range of possible antenna pointing options in their application. ViaSat suggests that a range would overestimate an earth station's potential affected area;¹⁰ however, the Satellite Operators believe that the risk of some overestimation is appropriately balanced against the needed flexibility the option would provide. Furthermore, the applicant should be required to define the worst case affected area for the proposed range, so that future earth station applicants have an understanding of the potential impact on the available population. This approach would create an appropriate balance between an earth station licensee's need for flexibility to repoint antennas to maintain service in the event of satellite failure or degradation, or to respond to customer and technical requirements quickly and the UMFUS licensees' need for clarity in understanding an earth station's affected area.

⁹ OneWeb Comments at 4-5.

¹⁰ See ViaSat Comments at 4-5.

D. ALL APPLICANTS SHOULD BE REQUIRED TO USE RELIABLE AND VERIFIABLE PROPAGATION MODELS AND TERRAIN AND CLUTTER DATA

The Satellite Operators reiterate their recommendation to use the well-established propagation model of International Telecommunication Union's Recommendation ITU-R P.452-16 for FSS earth stations communicating in either the 28 GHz or 37/39 GHz band. Furthermore, virtually all of the commenters agree that terrain and clutter should be considered when calculating an earth station's affected area.¹¹ Such information will be available at the time an application is prepared and is critical for presenting the most accurate picture possible of the proposed antenna's affected area. The Commission, however, should not dictate the specific tool applicants must use to calculate their affected area, but instead applicants should be allowed to use any publicly-available modeling tool that uses current and verifiable terrain and clutter data.

II. APPLICANTS SHOULD BE ALLOWED TO PROVIDE REFINED POPULATION COVERAGE DATA

In their original comments, the Satellite Operators recommended that earth station applicants seeking to operate in either the 28 GHz or 37/39 GHz bands should apply the actual area method to census block data in order to calculate the population affected by the proposed antenna.¹² While this baseline approach represents an appropriate means for demonstrating the affected population, the Satellite Operators agree with other commenters that in some cases the census block data may not be sufficiently granular. Therefore, an applicant should be able to provide additional, verifiable data to demonstrate the population coverage is in fact lower than

¹¹ See Satellite Operators Comments at 5, ViaSat Comments at 7-8; Comments of AT&T Services, Inc., IB Docket 17-172, at 5, (July 21, 2017) ("AT&T Comments"); *but see* Boeing Comments at 8-9. Hughes proposed making the use of terrain and clutter information optional, Hughes Comments at 5, but acknowledges that consideration of terrain and clutter with appropriate modeling tools will ensure the most accurate representation of a specific earth station's affected area, which in turn will support full use of the 28 GHz and 37/39 GHz band.

¹² Satellite Operators Comments at 7-8.

predicted by applying the actual area method to census block data. The Satellite Operators agree with OneWeb and ViaSat that other data, such as satellite imagery, could demonstrate that an antenna's affected area falls over an area with sparse or no population.¹³ Allowing such data will ensure the affected population in an UMFUS license area is accurately counted so that future earth station license applicants are not unreasonably constrained from being able to operate in the 28 GHz or 37/39 GHz bands within the same UMFUS license area.

The Satellite Operators disagree with AT&T's proposal to apportion the population limit among earth station operators in an UMFUS license area.¹⁴ As an initial matter, the Satellite Operators have separately objected and raised very serious problems with the requirement that no more than three FSS earth stations be located in a given UMFUS license area.¹⁵ However, whether or not the Commission chooses to maintain a limit on earth station sites, any attempt to apportion the population coverage limit in an UMFUS license area would unnecessarily limit potential earth station operations. First, each UMFUS license area may not be able to sustain more than one earth station. As several of the Satellite Operators have argued in the Spectrum Frontiers proceeding, counties and Partial Economic Areas that have low population will be less likely to host more than one earth station if the 0.1 percent population coverage threshold is maintained.¹⁶ Furthermore, there is no guarantee that FSS operators will seek to build more than one earth station in a given

¹³ OneWeb Comments at 9-10; ViaSat Comments at 10.

¹⁴ AT&T Comments at 3, 7.

¹⁵ Joint Reply to Oppositions of The Boeing Company, EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC, Inmarsat, Inc., Intelsat Corporation, O3b Limited, SES Americom, Inc., and WorldVu Satellites Ltd. d/b/a OneWeb, IB 14-177, *et al.*, at 13, (Feb. 24, 2017) ("Joint Satellite Reply"); Joint Petition for Reconsideration of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC and Inmarsat, Inc., IB Docket No. 14-177, *et al.*, at 20-21, (Dec. 14, 2016).

¹⁶ See Joint Satellite Reply at 6; *see also* Petition for Reconsideration of SES Americom, Inc. and O3b Limited, GN Docket No. 14-177, at 7-9 (Dec. 14, 2016) ("SES/O3b Petition").

UMFUS license area no matter how large the population, for example because the other restrictions imposed by Section 25.136, such as proximity to roads and railways, may reduce or eliminate available siting options. Therefore, under AT&T's apportionment proposal, the first earth station in the license area could be artificially constrained in its operations, resulting in inefficient spectrum use.

Additionally, there may be cases in which an earth station operator can demonstrate the proposed earth station covers zero population. Earth station license applicants should not be limited to a set ratio of population coverage within the population coverage threshold that the Commission has defined. The best way to ensure full use of the spectrum by FSS earth stations is to allow each operator to design its system to meet its needs and encourage all operators to work together to maximize use of the locations that are available in an UMFUS license area for earth station operations.

III. COLLOCATION

In the Public Notice, the Commission asked commenters to suggest ways to encourage earth station operators to collocate their antennas. In response, the Satellite Operators proposed three options that would encourage such collocation. First, when the interference zone of a new 28 GHz earth station will fall entirely within the interference zone of a grandfathered earth station,¹⁷ the population covered by the new earth station should not be a factor in processing the application. Second, when the interference zone of a new 28 GHz earth station overlaps with a grandfathered earth station, only the population affected by the non-overlapping portion of the new

¹⁷ In their initial comments, the Satellite Operators recommended that 28 GHz earth stations licensed under the grandfathering provision of Section 25.136 be excluded from the aggregate population coverage. Satellite Operators Comments at 6.

earth station's contour should be considered toward the county total.¹⁸ And third, when two earth stations not eligible for grandfathering are licensed in the same UMFUS license area in either the 28 GHz or 37/39 GHz band, any overlapping affected population should only be counted once. These proposals will encourage earth station operators to limit the number of separate sites they build within a particular UMFUS license area and reduce the overall impact on UMFUS deployment.

IV. CONCLUSION

The Satellite Operators recommend that the Commission adopt an earth station siting framework that will encourage earth station applicants to present accurate information about their proposed operations and the potential impact on the population within an UMFUS license area, while allowing some flexibility at the time of the application. Furthermore, earth station operators should be allowed to provide additional or new information that may better refine the overall view of the affected population all with the goal of encouraging FSS earth station access to the 28 GHz and 37/39 GHz bands while still providing UMFUS operators clarity on the environment in which they plan to deploy.

Respectfully submitted,

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¹⁸ See SES/O3b Petition at 17-18.

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